CoE/EE460
Switching Theory

Lecture 19

Washington University
Spring 2001

http://www.arl.wustl.edu/~lockwood/class/coe460/

Announcements

- Final Exam
  - Time
    - Friday May 4, 2001
    - 10:30am - 12:30pm
  - Place
    - Regular classroom
  - Material
    - Comprehensive
      - Exams 1-2
      - Lectures 1-19
      - Homeworks 1-8
  - Closed Book
    - Three pages of Notes allowed
- Homework 7:
  - Due Thursday, 5pm
  - Homework 8
    - Due Monday
- New Course
  - Fall 2001
  - CS535m :
    - Acceleration of Algorithms in Hardware
  - Network Packet processing in VHDL

State Identification

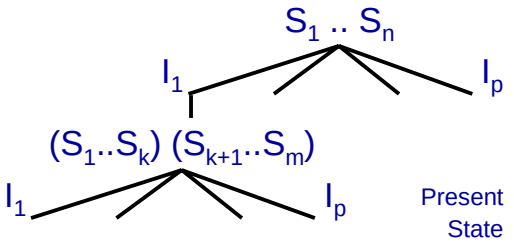
- Consider some machine, M
- Probe the system
  - Apply Inputs
  - Observe Output
  - Determine
    - Initial State
    - Final State
- Example:
  - Apply: 01
  - Apply: 011

Present State	Next state/ Output with X=0	Next state/ Output with X=1
A	C / 0	D / 1
B	C / 0	A / 1
C	A / 1	B / 0
D	B / 0	C / 1

State Uncertainties

- States
  - S_1 .. S_n
- Input
  - I_i
- Successor
  - Resulting States after input
    - Eg: 1-successor: Resulting state(s) after input of “1”
- Uncertainty Vector
  - $(S_1..S_k)$ $(S_{k+1}..S_n)$ ..
  - Homegeneous Vecor
    - (Single State) or (Same states)

Successor Tree



Present State	Next state/ Output with X=0	Next state/ Output with X=1
A	C / 0	D / 1
B	C / 0	A / 1
C	A / 1	B / 0
D	B / 0	C / 1

- Result is homogeneous if Uncertainty vector contains single state

Homing Sequence

- Input Sequence = Homing Sequence
  - Final state can be determine by response to input
- Uncertainty Vector
  - (S_1..S_k) (S_{k+1}..S_m) ..
    - (Components)
- Terminate On
  - Homogeneous Vector
  - Uncertainly appears earlier
- Example:

Present State	Next state/ Output with X=0	Next state/ Output with X=1
A	B / 0	D / 0
B	A / 0	B / 0
C	D / 1	A / 0
D	D / 1	C / 0

Synchronizing Sequence

- Takes machine to a specified state independent of initial state or output.
  - Ignores output
  - Ignores requested state
  - Terminate when:
    - Uncertainty seen earlier
    - Uncertainly contains one state
- Example:

Present State	Next state/ Output with X=0	Next state/ Output with X=1
A	B / 0	D / 0
B	A / 0	B / 0
C	D / 1	A / 0
D	D / 1	C / 0

Distinguishing Sequence

- Identifies Initial State
- Input Sequence = Distinguishing Sequence if
  - Output is unique for each possible initial state

Present State	Next state/ Output with X=0	Next state/ Output with X=1
A	C / 0	D / 1
B	C / 0	A / 1
C	A / 1	B / 0
D	B / 0	C / 1